



Giant radio telescope project advances at home and abroad

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The International Square Kilometre Array Steering Committee (ISSC), the international body responsible for overseeing the €1,5-billion Square Kilometre Array (SKA) radio telescope project, has set up a 'Specifications Tiger Team', which includes South Africa's representative on the ISSC, Rhodes University radio astronomer Professor Justin Jonas.

"The job of the Specifications Tiger Team is to come up with specification scenarios for the SKA using sophisticated costing models to guide the process so that we come up with an affordable instrument," explains Jonas. "We have until the Manchester ISSC meeting in October to get this process under way, and we have until next year to come up with specifications that will be reviewed by a select committee of our peers – Professor Roy Booth, director of the Hartesbeesthoek radio astronomy observatory (HartRAO), will chair this review committee."

The ISSC has 22 members, from the EU, Australia, Canada, China, India, South Africa, and the US. The Specifications Team has ten members, with a mixture of ISSC members and other scientists and engineers, including the project director, the project engineer, and the project scientist.

South Africa and Australia are the two countries shortlisted to host the SKA, which will have a collecting area of one-million square metres, equivalent to some 200 soccer pitches, and will be the largest radio telescope ever constructed. However, it should be noted that this collecting area will not be concentrated at a single location – rather, there will be a central core, from which outstations will radiate. Some of these outstations will be hundreds, perhaps even thousands, of kilo- metres from the core; all will be linked by high-capacity high-speed broadband connections.

"As yet, there is no movement regarding the decision on where to site the instrument," he reports. "There is a reluctance on the part of most of the partners to make an early decision – we, in South Africa, would like it to be a bit more expedient." The SKA is now not likely to come into service before 2020, if the final site decision is delayed until 2011 or later.

Meanwhile, the International SKA Project Office (ISPO) is being moved from Groningen, in the Netherlands, to Manchester, in the UK, and is also being expanded to include a central design and integration team. These ISPO developments are being funded by the EU, with contributions from individual countries involved in the SKA project. (The University of Manchester is a world-leading centre for radio astronomy, overseeing, for example, the iconic Jodrell Bank radio telescope.)

The EU, under its framework research programme 7 (FP7), is expected to fund the recently proposed 'Preparatory Study for the SKA' (Prep-SKA). As FP projects can and do involve non-EU partners, the PrepSKA involves all the SKA member countries, not just the EU ones. Thus, the SKA South Africa project office was involved in the drafting of the PrepSKA proposal and South African engineers and scientists will be participating in the work packages specified in the programme.

Meanwhile, across the Atlantic, the US National Science Foundation (NSF) has released funds for SKA-related studies, known as the Technology Development Programme (TDP). "Several millions of dollars will be provided over the next five years for the TDP to undertake design and technology studies," explains Jonas. The TDP, although relatively small by the standards of the US, is significant because it marks the first time that the NSF has committed funds to an SKA-

specific project.

Progress is also being made in South Africa. Construction and erection of the prototype experimental demonstrator model (XDM) radio telescope dish at HartRAO, west of Pretoria, was completed in April. With a diameter of 15 m, it is the largest radio astronomy dish ever constructed from composite materials. This innovative approach was chosen in an attempt to significantly reduce the cost of constructing antennas for radio astronomy and so make the SKA affordable.

"The XDM is now being subjected to mechanical and electronic tests, and acceptance tests will start soon," says Jonas. The integration of the software necessary to allow the dish to function as a scientific instrument has begun.

The XDM is the prototype unit for South Africa's MeerKAT radio telescope array, which, in turn, is intended as a precursor to the SKA. MeerKAT evolved from the original idea of a Karoo Array Telescope (KAT) and, for the benefit of non-Afrikaans-speakers, its name is a play on words: in addition to the allusion to the lovable African animal, meer is also the Afrikaans word for 'more' – thus, 'MoreKAT', because MeerKAT will be a more capable instrument than the original KAT.

All being well, MeerKAT will be composed of a number (60 or more) of XDM-type dishes working together as an array, and will be a major scientific instrument in its own right. The first phase of MeerKAT, an array of seven dishes dubbed KAT-7, is scheduled for completion by 2009. MeerKAT and KAT-7 will be sited in the Karoo, some 100 km north-west of the town of Carnarvon, in the Northern Cape.

In the interim, the XDM will function both as a stand-alone radio telescope and as a test-bed for MeerKAT subsystems.

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